

"Locking system, in particular for motor vehicles"

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The invention relates to an electronic lock in accordance with the preamble of patent claim 1.

5 An electronic lock of this type is used in motor vehicles as an electronic ignition lock for operating an associated operating unit, such as an engine controlling means, an immobilizer or the like.

WO 95/09746 discloses a locking system for a 10 motor vehicle, which comprises an electronic lock and an associated electronic key. The lock has a holder into which the key can be introduced. Situated in the lock is a switching element (merely indicated schematically) which can be actuated by the movement of 15 the key as it is being introduced into the holder. The actuation of the switching element, whose switching signal can be interpreted as a "key inserted" signal, then switches on the normal operation of key and lock, the key in the holder exchanging at least one coding 20 operating signal with the lock. After positive evaluation of the transmitted operating signal, i.e. if the key is the authorized one, release of the lock for movement of the holder by means of the key into at least one actuating position can be triggered. Starting 25 up of the operating unit then takes place in the actuating position.

For security reasons, normal operation of key and lock has to be error-free. For this purpose, it is necessary to ensure that actuation of the switching 30 element on introduction of the key into the holder is not error-prone. An idea to this effect cannot be inferred from WO 95/09746, since the switching element there can only be seen purely schematically.

Furthermore, it has turned out that operating 35 states of the lock may occur in which the lock is released although the key has not been introduced, or not introduced completely, into the holder. In such an operating state it is possible for the holder to be moved into the actuation position. Manipulation of the

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switching element, and therefore of the "key inserted" signal, is not ruled out, in particular on removal of the key from the holder. As is immediately apparent, the security against theft is reduced as a result.

5 EP-A1-0 464 278 describes a lock which has a rotor which can be locked by means of magnetic tappets as tumblers. A key can be introduced into a holder of the rotor, the bit of the key being provided with a plurality of magnetic elements. If the key is the one
10 associated with the lock, the magnetic elements correspond to the tappets, with the result that the effect of the magnetic force causes the tappets to be adjusted in order to release the movement of the rotor. At the same time, the tappets, as they are being
15 adjusted, directly actuate associated switching elements which in turn enable an electric circuit in the motor vehicle.

Although the tumblers in this lock are moved magnetically, the lock otherwise functions essentially
20 in the manner of a conventional, mechanical lock. The security of an electronic lock, in which a coded operating signal is exchanged with the key to bring about the release, is therefore not achieved here. Furthermore, it is disadvantageous that the magnetic
25 tappet acts directly on the switching element. This firstly restricts the options for arranging the switching element in the lock. Secondly, the security against the switching element being manipulated is likewise not ensured. Consequently, EP-A1-0 464 278
30 does not impart more extensive ideas for the configuration of an electronic lock.

INS A3 Taking WO 95/09746 as the starting point, the invention is based on the object of providing the lock with a means of actuating the switching element which
35 is secure and is not prone to error.

This object is achieved in a generic electronic lock by means of the defining features of claim 1.

The lock has a further blocking element which executes an adjusting movement on introduction of the

		decoder)) with control\$4) and ((assign\$4 with bits) with (register\$1 or buffer or memory)) and task\$1 and status\$2	11:59:59
S1686	U	PGPB,USPT,EPAB,JPAB,DWPI((codec or (encoder with decoder)) with control\$4) and ((assign\$4 with bits) with (register\$1 or buffer or memory)) and task\$1 and status\$2	2005-04-15 11:59:08
S1685	U	PGPB,USPT,EPAB,JPAB,DWPI((status with register\$1) same codec same (video or picture\$1 or frame\$1))	2005-04-14 17:34:04
S1684	U	PGPB,USPT,EPAB,JPAB,DWPI((status with register\$1) same covec same (video or picture\$1 or frame\$1))	2005-04-14 17:32:40

the subclaims.

15 The blocking element can be designed in the manner of a mechanical blocking slide. This blocking slide is mounted movably on the holder and/or in the immediate vicinity of the holder and can be brought by means of the key into or out of operative connection
20 with a groove in the housing of the lock for additional blocking or release of the movement of the holder. The design of the blocking slide as a spring-loaded, opposed pair of slides is preferred, ensuring, as a result, that the blocking slide exerts an essentially
25 symmetrical force. Also, a further, additional blocking slide can be in operative connection with the electronic key in the actuation position of the holder in such a manner that removal of the key from the holder is prevented.

30 Provision is made to subject the blocking element to a spring force in the direction of the groove in the housing of the lock. As a result, when the key is outside the holder or when it is not correctly in the holder, the blocking element protrudes
35 into the groove in order to block the movement of the holder. If, on the other hand, the key is correctly in the holder, the blocking element is secured outside the groove by the key, resulting in this blocking of the movement of the holder being canceled. An extension on

			state with bitplane\$1)	14
				16:05:59
<u>S1672</u>	<u>U</u>	USPT	(first bitplane same codeword\$1	2005-04-
			same state) and ((bit plane\$1	14
			same table\$1) same entropy)	15:57:28
			and 6873734.pn.	
<u>S1671</u>	<u>U</u>	USPT	((bit plane\$1 same table\$1)	2005-04-
			same entropy) and 6873734.pn.	14
				15:55:50
<u>S1670</u>	<u>U</u>	USPT	(bit plane\$1 same table\$1) and	2005-04-
			entropy and 6873734.pn.	14
				15:55:26
<u>S1669</u>	<u>U</u>	USPT	(bit plane\$1 same table\$1) and	2005-04-
			6873734.pn.	14
				15:53:53
<u>S1668</u>	<u>U</u>	USPT	(bit plane\$1 same table\$1) and	2005-04-
			6873734.pn.	14
				15:53:42
<u>S1667</u>	<u>U</u>	USPT	(coding with table) and	2005-04-
			6873734.pn.	14
				15:52:43
<u>S1666</u>	<u>U</u>	USPT	(entropy with coding with table)	2005-04-
			and 6873734.pn.	14
				15:51:33
<u>S1665</u>	<u>U</u>	USPT	(bit plane\$1 with (zero\$2 or 0))	2005-04-
			and 6873734.pn.	14
				15:47:47
<u>S1664</u>	<u>U</u>	USPT	(bit plane\$1 with (zero\$2 or 0))	2005-04-
				14
				15:47:21
<u>S1663</u>	<u>U</u>	USPT	(coding with table\$1) and	2005-04-
			6873734.pn.	14
				14:59:08
<u>S1662</u>	<u>U</u>	USPT	coding table\$1 and 6873734.pn.	2005-04-
				14
				14:58:49
<u>S1661</u>	<u>U</u>	USPT	state and 6873734.pn.	2005-04-
				14
				14:57:13
<u>S1660</u>	<u>U</u>	USPT	((coding or coded) with table)	2005-04-
			and 6873734.pn.	14
				14:07:50
<u>S1659</u>	<u>U</u>	USPT	(coding with table) and	2005-04-
			6873734.pn.	14
				14:07:26
<u>S1658</u>	<u>U</u>	USPT	(coding with table with entropy)	2005-04-
			and 6873734.pn.	14
				14:07:09

<u>S1657</u>	<u>U</u>	USPT	(DCT or discrete cosine transform) and 6873734.pn.	2005-04-14
				14:01:16
<u>S1656</u>	<u>U</u>	USPT	(bit plane\$1 same state) and 6873734.pn.	2005-04-14
				13:26:41
<u>S1655</u>	<u>U</u>	USPT	((bit plane\$1 same state) same codedword\$1) and 6873734.pn.	2005-04-14
				13:26:20
<u>S1654</u>	<u>U</u>	PGPB,USPT,EPAB,JPAB,DWPI(msb or most significant bit) and entropy and codeword\$1 and table\$1 and ((coding or coded or codes) same bit plane\$1 same state\$1) and (binary with (zero or 0))	2005-04-14	13:03:32